CLIF MOCK™

LGS-2000 Sampling System

User Manual

Manual No. 9A-70165003, Rev. 01

Important Safety Information

Symbols and Terms Used in this Manual

WARNING: This symbol identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss.

CAUTION: Indicates actions or procedures which if not performed correctly may lead to personal injury or incorrect function of the instrument or connected equipment.

Important: Indicates actions or procedures which may affect instrument operation or may lead to an instrument response which is not planned.

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Section 1—LGS-2000 System Overview

The Clif Mock LGS-2000 Sampling System pairs a microcontroller-based electronic sample controller with an integral liquid/gas sample pump for sampling liquid or gas flow streams. The sample pump connects directly or remotely to a sample probe and to a sampler receiver used to collect samples for analysis. See the Cameron website or contact your local Cameron sales representative for information on Cameron probes and receivers, sold separately.

The LGS-2000 system is designed to operate with system pressures ranging between 30 psi to 1200 psi with the standard solenoid (30 psi to 1500 with the premium solenoid) and system temperatures ranging from –15° to 375°F.

The standard system is powered by an internal 7.2-volt lithium battery pack for long-lasting performance. At a sampling rate of one sample every 10 minutes, the battery is shown to last an average of 18 months. In solar-powered applications, a rechargeable lead acid battery is substituted. An external DC power supply can also be used to power the system, in which case the lithium battery provides backup protection.

The system supports two flow volume inputs. It can detect a signal from the magnetic pickup of a turbine flowmeter in the range of 20 mV to 200 mV, peak to peak, and it can sense a positive displacement meter contact closure input.

While external communications are not required for operating the LGS-2000 system, external Modbus communicating devices or Modbus SCADA systems can be connected to the controller for collecting real-time data or for configuring the controller remotely.

The system is CSA certified for use in Class I, Division 1, Groups A, B, C, and D hazardous areas when installed in accordance with Cameron instructions. If an external 12V power supply is to be used in a hazardous area, power must be routed through a CSA-certified safety barrier to retain CSA certification.

This document describes the installation and typical configuration of the LGS-2000 system. For additional information about the installation, operation and maintenace of individual components, see the following component manuals provided with the LGS-2000 system, and available for download from the Cameron Measurement Systems website:

- True Cut 2000 Sampler Controller User Manual, Part No. 9A-70165002
- LGS-1 Sample Pump User Manual, Part No. 9A-99104500147

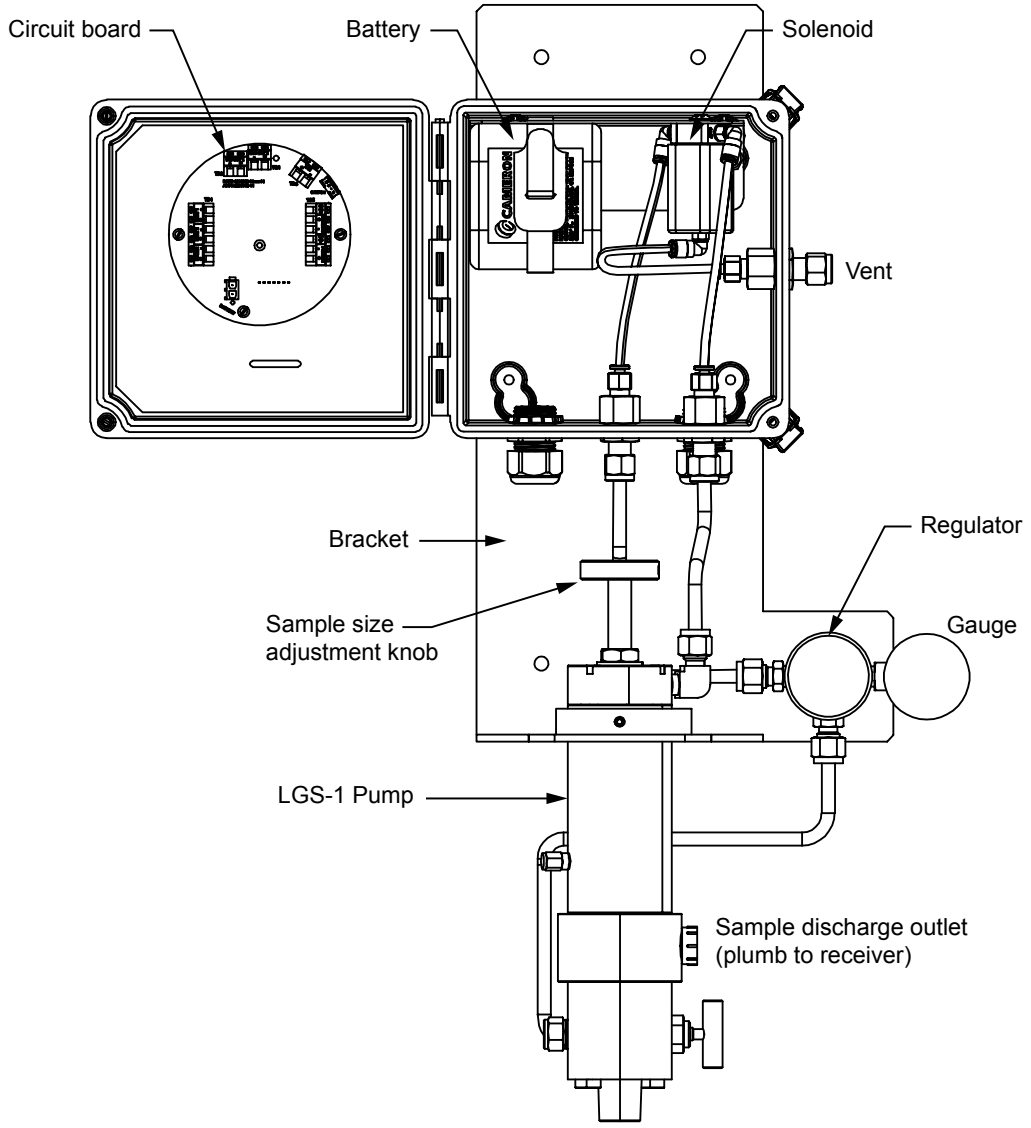

Figure 1.1—LGS-2000 components

LGS 2000 System Components

Sampler Controller

The TrueCut 2000 Sampler Controller can be configured as a timer or a pulse counter for sampling product proportional to time or proportional to volume. This allows external pacing devices such as positive displacement meters, turbines meters, or dry contact closures from computers to control the sampling frequency while the controller displays the total volume and flow rate. Ideally, the controller should be configured prior to installing the system in the field.

LGS-1 Pump

The controller is connected to the sample pump by a bracket and collar assembly. When the pump is correctly positioned inside the collar, a set screw in the side of the collar (Figure 1.2) is used to secure the pump to the bracket.

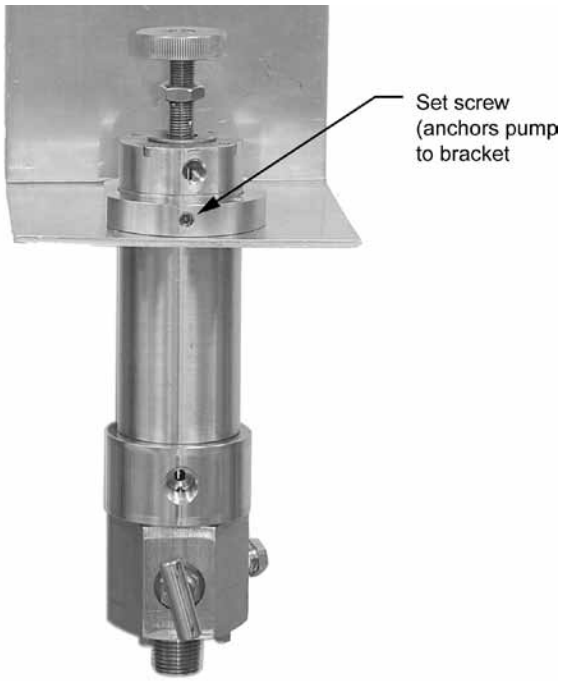

Figure 1.2—Sample pump and bracket assembly

Air Pressure Regulator

The regulator supplied with the LGS 2000 Sampling System ensures that incoming air pressure is reduced to 120 psi before it reaches the solenoid. Cameron's standard regulator input is rated at 3000 psi maximum. Additionally, a premium regulator (3600 psi maximum) is available with stainless steel construction, and an economy model (300 psi maximum) is available for use with external compressed air.

The standard or premium regulator is plumbed to either a fitting on the pump (when pipeline pressure is actuating the pump), or to an external air supply (recommended for liquid applications and some low-pressure gas applications). The economy regulator can be used only with an external air supply.

Pressure Gauge

A 2-in. pressure gauge is mounted at the top of the regulator, and provides a readout of actuation air pressure. See the LGS-1 Sample Pump User Manual for a chart that can be used to determine the appropriate actuation air pressure for a specific application. To set the pressure, adjust the regulator knob on the back of the sampler bracket.

Other Required Customer-Supplied Equipment

Sample Probe

A sample probe delivers the sample fluid to the supply inlet of the purge valve manifold connected to the bottom of the pump. The probe should be made of non corrosive material. 316 stainless steel tubing is recommended.

Sample Receiver

A vented receiver or pressure-balanced cylinder should be connected to the discharge outlet of the pump to collect the samples. The size of the receiver is typically entered into the controller when configuring sample frequency.

If a pressurized receiver is used, an outlet check valve should be installed between the sample discharge outlet and the receiver to prevent the process fluid from flowing back back to the pump. The valve is an accessory supplied by Cameron (Part No. 9A-50142303543).

External Air Supply

Pipeline gas is frequently used to actuate the pump in gas sampling applications. However, in liquid applications and some low-pressure gas applications, an external air supply is required. To determine whether an external air supply is required for a gas application, the user must determine the pipeline pressure of the fluid to be sampled. If pipeline pressure is below 15 psi, an external air supply is required to actuate the pump. See the LGS-1 Sample Pump User Manual for details.

Safety Barrier

If an external 12V power supply is to be used, and the LGS-2000 is installed in a hazardous area, power must be routed through a CSA-certified safety barrier. See the True Cut 2000 Sampler Controller User Manual for minimum safety barrier requirements.

Product Identification

A serial tag mounted to the outside of the controller enclosure identifies the product by its part number and serial number (Figure 1.3). The maximum working pressure of the LGS-2000 is stamped on the tag, along with the working pressure of the controller (Solenoid Max WP). Each tag is also marked to show which battery pack is installed and the temperature range for which it is rated.

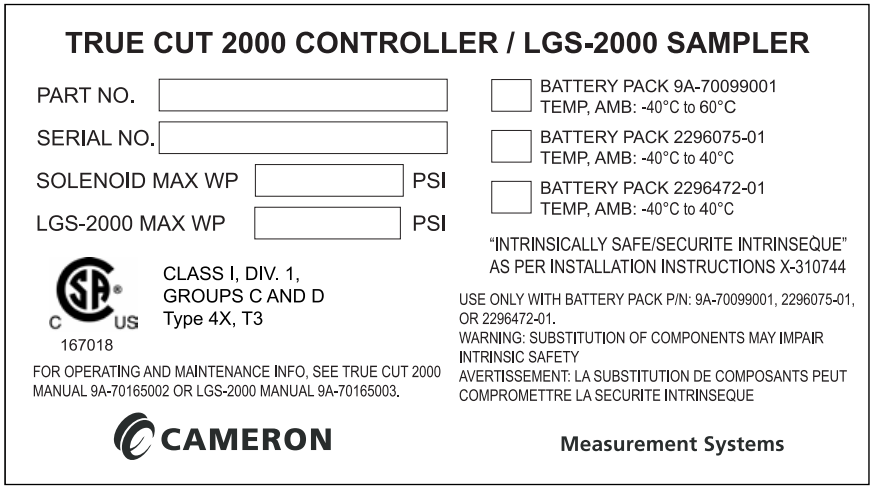
TRUE CUT 2000 CONTROLLER / LGS-2000 SAMPLER
PART NO.
SERIAL NO.
SOLENOID MAX WP
PSI
LGS-2000 MAX WP
PSI
BATTERY PACK 9A-70099001
TEMP, AMB: -40°C to 60°C
BATTERY PACK 2296075-01
TEMP, AMB: -40°C to 40°C
BATTERY PACK 2296472-01
TEMP, AMB: -40°C to 40°C
"INTRINSICALLY SAFE/SECURITE INTRINSEQUE"
AS PER INSTALLATION INSTRUCTIONS X-310744
CLASS I, DIV. 1,
GROUPS C AND D
Type 4X, T3
C US
167018
USE ONLY WITH BATTERY PACK P/N: 9A-70099001, 2296075-01, OR 2296472-01.
WARNING: SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY
AVERTISSEMENT: LA SUBSTITUTION DE COMPOSANTS PEUT COMPROMETTRE LA SECURITE INTRINSEQUE
FOR OPERATING AND MAINTENANCE INFO, SEE TRUE CUT 2000 MANUAL 9A-70165002 OR LGS-2000 MANUAL 9A-70165003.
CAMERON
Measurement Systems

Figure 1.3—Serial tag

Table 1.1—LGS-2000 Sampler Specifications

Sampler Controller	True Cut 2000 Sampler Controller Supports time-based and volume-based sampling of gases and liquids Accepts inputs from turbine flowmeters and pulse-generating devices *See the True Cut 2000 Sampler Controller User Manual, Part No. 9A-70165002, for enclosure, solenoid, power supply, keypad security, and input/output specifications.*
Power Supply	7.2V lithium battery pack, 6V rechargeable lead acid battery and solar panel, or 9-15V external power supply *See the True Cut 2000 Sampler Controller User Manual, Part No. 9A-70165002, for details.*
Operating Environment	-40°F to 140°F (-40°C to 60°C) or -40°F to 104°F (-40°C to 40°C), battery dependent
	0 to 90% non-condensing relative humidity
	LCD contrast is reduced below -22°F (-30°C)
Pump	LGS-1 Sample Pump Stainless steel construction Maximum working pressure: 1500 psi *See the LGS-1 Sample Pump User Manual, Part No. 9A-99104500147, for details.*
Regulator	Standard: 3000 PSI in, 200 PSI max out (brass)
	Premium: 3600 PSI in, 200 PSI max out (stainless steel)
	Economy: 300 PSI in, 200 PSI max out (zinc), external air is required
Maximum Air Pressure to Solenoid	100 psi (standard solenoid) or 120 psi (premium stainless steel solenoid) *See the True Cut 2000 Sampler Controller User Manual, Part No. 9A-70165002, for details.*
Communications	2 RS-485 communication ports (RTU Modbus®) *See the True Cut 2000 Sampler Controller User Manual, Part No. 9A-70165002, for wiring details.*
Mounting Options	Direct mount to sample probe
	Remote mount to 2-in. vertical pipe with top-of-pipe mount or U-bolts
Safety Approval	Intrinsically Safe - Class I, Division 1, Groups C and D for use in the US and Canada

Section 2—System Installation

General Information

The LGS-2000 Sampling System can be mounted using any of three basic methods:

- Direct Mount (Recommended)—The sampler may be mounted directly on the sample probe. This eliminates the need for tubing and provides the shortest path for the sample fluid. This method is preferred when the piping configuration allows. If pipeline vibration is a concern, additional support may be added for the enclosure.
- Remote Mount (Bulkhead)—The sampler may be bulkhead-mounted to a flat surface using holes provided in the mounting bracket supplied with the LGS-2000 system. A stainless steel tube is used to convey the sample fluid from the sample probe to the inlet of the purge valve manifold.
- Remote Mount (Pipe Mount)—The sampler may be mounted to a 2-in. vertical pipe using a pair of U-bolts or a top-of-pipe bracket, both sold separately. A stainless steel tube is used to convey the sample fluid from the sample probe to the inlet of the purge valve manifold.

Step-by-step instructions for installing the system are provided below. See Figures 2.4 and 2.5, pages 14 and 15, for typical arrangement of direct-mount and remote-mount installations.

Hazardous Area Precautions

External Power

When powering the True Cut 2000 in a hazardous area with 9-15 VDC power supply, the cable must be routed through an I.S.-rated safety barrier in the safe area. The barrier must be rated for 15V maximum and 40 ohms minimum. The power supply and cable must be capable of supplying 8 to 15 VDC @ 375 mA through the intrinsic safety barrier. The external power supply must be an approved SELV source, insulated from the AC main by double/ reinforced insulation per CSA C22.2 No. 61010-1-04/ UL 61010-1 – 2nd Edition.

Important: A switch or circuit breaker must be included in the safe area external power supply installation within easy reach of the operator. The switch or circuit breaker must be marked as the “disconnect” for the external DC power supply.

Communications

When the True Cut 2000 controller is connected to an external communications device via an RS-485 port, power must be routed through an I.S.-rated safety barrier.

Installation Procedure

The following procedure is a guide to a typical installation. Tubing arrangements will vary, depending on the product sampled (gas or liquid). Typical connections are shown in Figures 2.4 and 2.5, pages 14 and 15. For more information on remote mount or fast-loop tubing configurations, see the LGS-1 Sample Pump User Manual.

1. Mount the sample probe vertically in a horizontal pipe run as per API Chapter 8, Section 2 and be located as per API Chapter 8, Section 2, Appendix A. The end of the sample probe should be cut at a 45º angle to the pipeline and should penetrate into the center one half of the pipeline.

2. Connect the pump either directly or indirectly to the sample probe, as described in the LGS-1 Sample Pump User Manual supplied with the LGS-2000 system.

3. Connect the pump discharge outlet to the sample receiver using 1/4 in. stainless steel tubing.

Important **If a pressurized receiver is used, install an outlet check valve between the sample discharge outlet and the receiver to prevent the process fluid from flowing back back to the pump. The valve is an accessory supplied by Cameron (Part No. 9A-50142303543).**

4. Make sure the "inlet" and "outlet" connections at the bottom of the controller enclosure are secure; tighten if required. The "inlet" connection supplies air pressure from the regulator to the solenoid inside the enclosure. The "outlet:" connection supplies air pressure from the solenoid to actuate the pump.

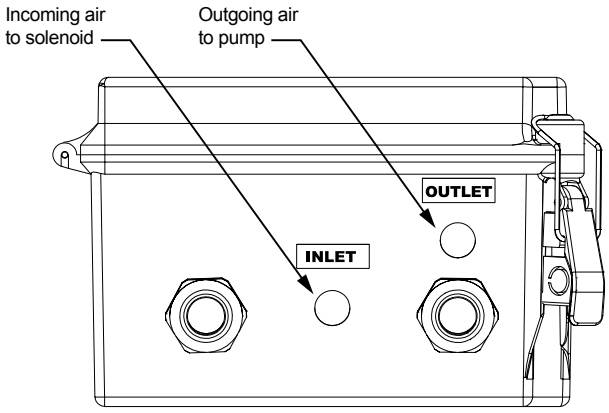

Figure 2.1—Controller inlet and outlet connections

5. If using an external air supply, connect the air supply discharge outlet to the regulator using stainless tubing. If process gas will be used to actuate the pump, the air supply tubing will be connected to the pump at the factory as shown in Figure 2.2.

6. Adjust the regulator adjustment knob until the pressure gauge displays the appropriate pump actuation pressure for the application.

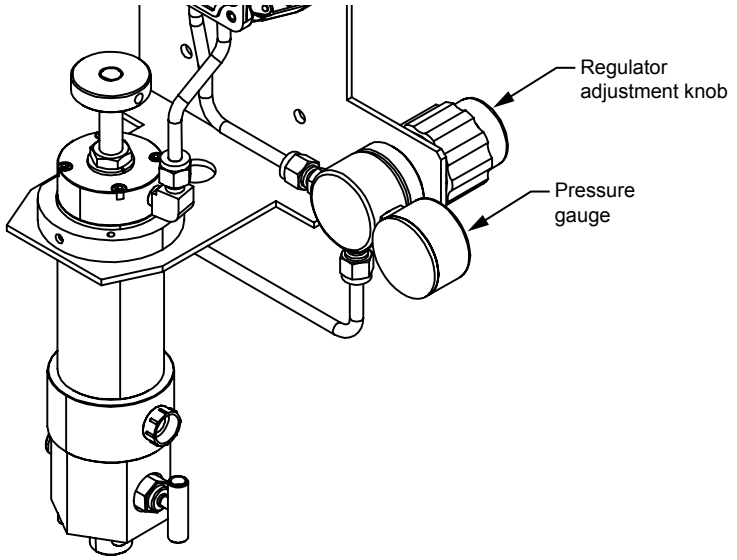

Figure 2.2—Regulator adjustment control

7. If a fast loop connection is required, connect the reinjection line fitting in the side of the purge valve manifold to the low-pressure side of the orifice fitting in the pipeline as shown in Figure 2.5, page 15. See Figure 2.3 for the location of the fast-loop reinjection line fitting. Also see the LGS-1 Sample Pump User Manual, Part No. 9A-99104500147, for additional details.

8. Cover the vent hole in the side of the pump with 1/16-17 NPT screen, if necessary, to prevent buildup of debris in the hole.

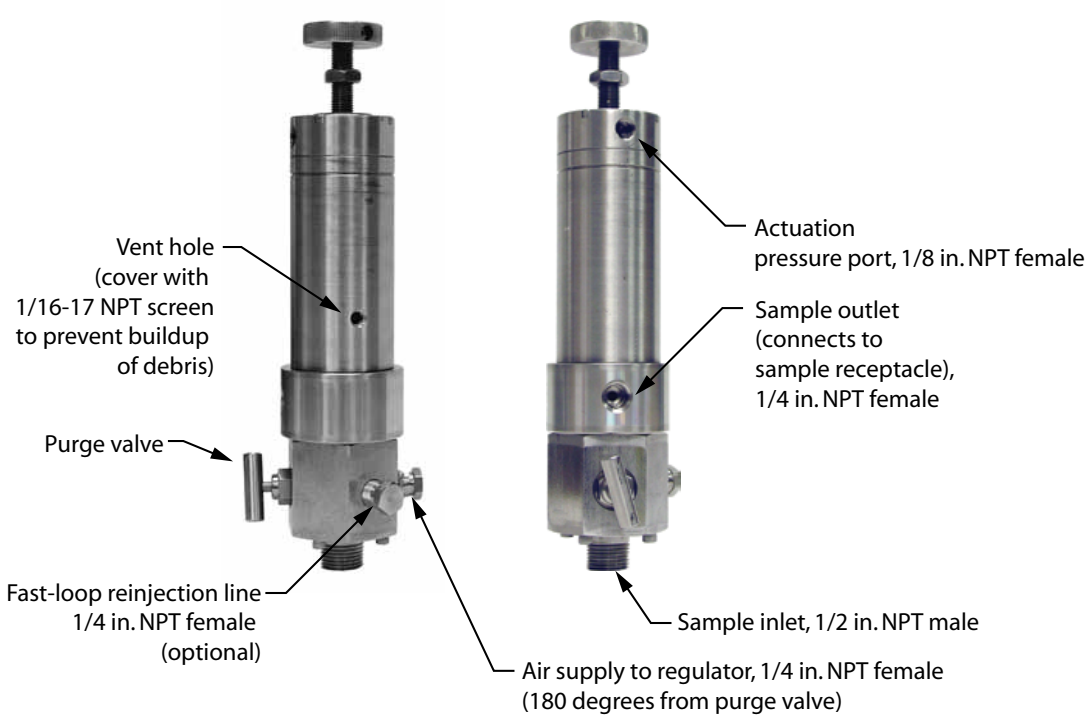

Figure 2.3—Pump tubing connections; note the orientation of the images above (the photo on the right is rotated 90 degrees clockwise from the position shown in the left photo)

9. Connect field wiring (flowmeter input, solenoid, and if desired, communications) to the controller following the instructions provided in the True Cut 2000 Sampler Controller User Manual.

Important: Before attempting to operate the LGS-2000 system, make sure the solenoid valve assembly cable is securely connected to TB2 on the controller circuit board. When power is supplied to the device, an audible clicking sound is generated when the solenoid is operating properly.

10. Connect power (battery or external power) and observe the display boot-up sequence.

11. Set the sample size by adjusting the pump, and configure the controller. Instructions are provided in the True Cut 2000 Sampler Controller User Manual, Part No. 9A-70165002, and on laminated quick reference cards supplied inside the controller enclosure.

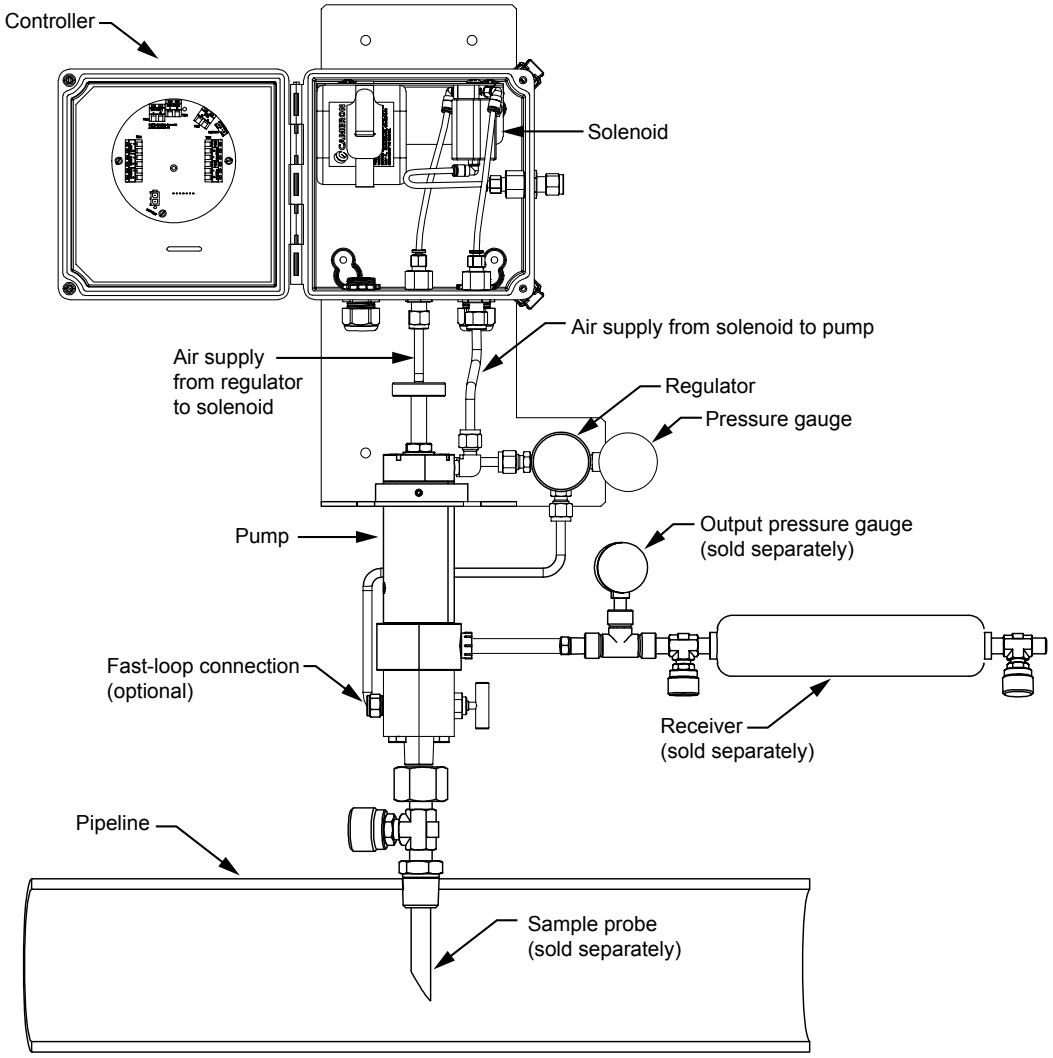

Figure 2.4—Direct-mount installation, shown with optional fast-loop connections

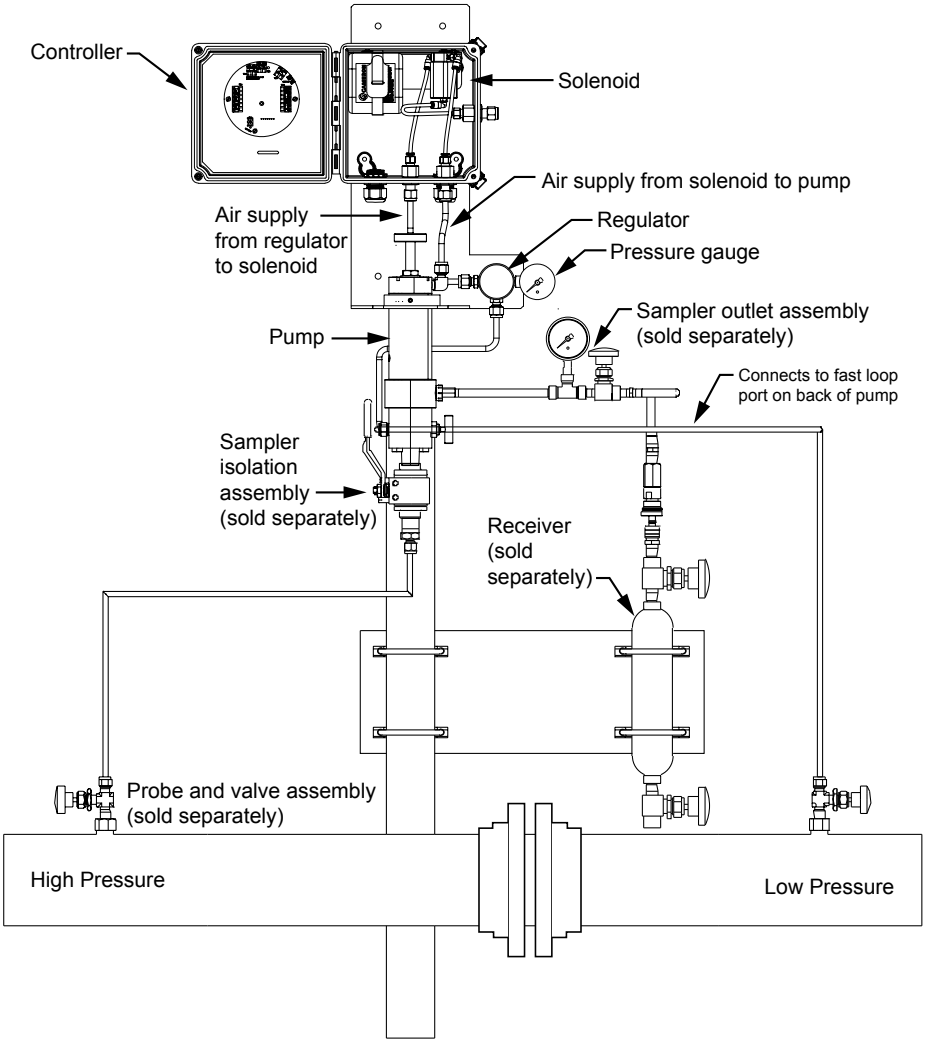

Figure 2.5—Remote-mount installation, shown with optional fast-loop connections

Section 3—LGS-2000 Sampling System Parts

WARNING: EXPLOSION HAZARD—Substitution of components may impair suitability for Class I, Division 1. Use of spare parts other than those identified by Cameron International Corporation voids hazardous area certification. Cameron bears no legal responsibility for the performance of a product that has been serviced or repaired with parts that are not authorized by Cameron.

Table 3.1—True Cut 2000 Controller

Part Number	Description
2295850-01	Circuit Board Assembly
9A-70099001	Battery Assembly, Lithium Pack, 7.2 VDC (2 D Cell)
2296472-01	Battery Assembly, Lead Acid, 6 VDC
2296473-01	Assembly, Solar Panel with Connector (for use with lead acid battery pack Part No. 2296472-01)
2296735-01	Standard Solenoid with Diode Assembly, 100 psi (plastic)
2296736-01	Premium Solenoid with Diode Assembly, 120 psi (stainless steel)
9A-50132600271	Direct Mount Solar Installation Kit (includes solar panel, mounting hardware, lead acid battery pack and cable/connector)
2296685-01	Remote Mount Solar Installation Kit (includes solar panel, mounting hardware, lead acid battery pack and cable/connector)

Table 3.2—LGS-1 Pump

Part Number	Description
9A-50132160150	LGS-1 Sample Pump Assembly
9A-50142150715	Overhaul Kit (contains O-rings and springs for full overhaul of the LGS-1 pump)
9A-50142150708	Seal Kit (contains O-rings for the LGS-1 pump and purge valve manifold)
9A-50142200643	Filter, LGS-1, 40-micron

Table 3.3—Regulators and Gauges

Part Number	Description
2296099-01	Standard Regulator, 3000 PSI input, 200 psi max output (brass)
9A-50142200605	Premium Regulator, 3600 PSI input, 200 psi max output (stainless steel)
9A-50142208070	Economy Regulator, 300 PSI input, 200 psi max output (zinc), external air required
2296179-01	Gauge, 0-160 psi
2296180-01	Gauge, 0-300 psi

Table 3.4—Accessories

Part Number	***Description***
9A-66046405010	Hardware, Remote Mount, Top of Pole
9A-100023269	Hardware, Remote Mount, U-Bolt, Set of Two
9A-50132307870	True Cut Probe and Valve Assembly
9A-50142303543	Outlet Check Valve, 1 psi (required for installations with pressurized receivers)

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